SPECIAL COMPETITION IN SYSTEMATIC BIOLOGY:

PARTNERSHIPS FOR ENHANCING EXPERTISE IN TAXONOMY (PEET)

Announcement and Guidelines

DIRECTORATE FOR BIOLOGICAL SCIENCES
DIVISION OF ENVIRONMENTAL BIOLOGY

DEADLINE (POSTMARK) DATE: ***March 1, 1997***

NATIONAL SCIENCE FOUNDATION

Special Competition in Systematic Biology:
Partnerships for Enhancing Expertise in Taxonomy - PEET

Introduction

For the next generation of astronomers, the stars will still be there; for the next generation of biologists, the objects of their study may not be. The loss of biological diversity—of species and their genetic heritage, of communities and habitats, both aquatic and terrestrial—is accelerating in many parts of the world. That loss, exacerbated by our incomplete knowledge of the Earth's biota, diminishes stewardship, restricts management, and imperils conservation of biological resources. Two components of this global problem have been emphasized in all recent reports. Fewer systematists (taxonomists) are being trained in universities and museums as education is reduced in organismal and evolutionary biology. Secondly, knowledge is rudimentary for microbes, protists, fungi, and invertebrates, groups in which vast numbers of undescribed species are predicted for habitats still poorly explored on Earth.

The loss of biological diversity has been accompanied by a loss in the expertise necessary for identifying and inventorying the biota of the Earth. Retirement of taxonomic specialists, shifts in academic recruitment and staffing, and reductions in graduate training all conspire to diminish the knowledge that is needed to answer what the National Science Board has labeled a global crisis ("Loss of Biological Diversity: A Global Crisis Requiring International Solutions", NSB 89-171). The rate of "extinction" among professional taxonomists led a National Science Foundation task force to call for enhanced training in taxon-specific expertise ("Adapting to the Future: Report of the BBS Task Force Looking to the 21st Century", NSF 91-69).

Exacerbating this loss of expertise is the poor state of knowledge of many aquatic and terrestrial organisms. Vast numbers of species in understudied, "invisible" groups constitute critical elements of food chains and ecosystems; the high proportion of unrecognized species in these groups limits research and progress in many areas of the biological sciences. Taxonomic expertise is needed to identify and classify the world's biological resources and to organize this knowledge in accessible databases in order to ensure stewardship and rational use.

Description and Objectives of PEET

The National Science Foundation (NSF), in partnership with academic institutions, botanical gardens, freshwater and marine institutes, and natural history museums, seeks to enhance and stimulate taxonomic research and help prepare future generations of experts. NSF announces a second special competition, Partnerships for Enhancing Expertise in Taxonomy (PEET), to support competitively reviewed research projects that target groups of poorly known organisms. This effort is designed to encourage the training of new generations of taxonomists and to translate current expertise into electronic databases and other formats with broad accessibility to the scientific community. Three major elements are required of a project submitted in the PEET Special Competition: 1. **Monographic Research**; 2. **Training**; and 3. **Computer Infrastructure**.

1. **Monographic Research**. Applicants must present a plan of research for taxonomic revision or monograph, with emphasis to be given to organisms that are little studied or to groups in which taxonomic expertise is limited or vanishing (microbes, protists, fungi, and invertebrates). Specialists on such groups are encouraged to apply. Also encouraged are investigators currently studying better known groups or other scientists with taxonomic interests who wish to extend analyses to neglected taxa, directly or by mentoring students. Choice of organisms for study must be justified in the proposal and will be evaluated by the merit review process. General guidance is provided in several reports: a 1980 National Academy of Sciences report, the 1989 National Science Board report cited above, a 1992 National Academy report, and the 1994 report "Systematics Agenda 2000: Charting the Biosphere. Technical Report" (Systematics Agenda 2000 Consortium, New York, N.Y.). The 1980 National Academy report indicated "that a high priority ought to be set on training and support for much larger numbers of systematists oriented toward tropical organisms." Organisms mentioned in that report include fungi, nematodes, mollusks, insects, fishes, and flowering plants. The subsequent reports cited do not specify taxonomic groups but in general emphasize organisms that are poorly known or little studied; these would include microbes, protists, fungi, and invertebrates. Potential investigators with questions about which organisms are eligible for study in the PEET special competition should contact program officers in Systematic Biology (see section on Further Information for telephone, e-mail, and address information). If groups of investigators with complementary strengths in taxonomy wish to collaborate, submission of a Group Proposal should be considered (see "Grant Proposal Guide," NSF 95-27, page 11; the requirement for two trainees per Investigator holds).

[1] [Committee on Research Priorities in Tropical Biology]. 1980 "Research Priorities in Tropical Biology." National Academy of Sciences, Washington, D.C.

[2] [Panel on Biodiversity Research Priorities]. 1992. "Conserving Biodiversity: A Research Agenda for Development Agencies." National Academy Press, Washington, D.C.

2. **Training**. An internship or traineeship is a required element of PEET projects, in which two student taxonomists are trained as experts on the organisms under study. The anticipated five-year duration of projects is designed to ensure continuous support of project personnel and to enable completion of major taxonomic revisions and monographs. Increased participation of members of groups underrepresented in science is encouraged. Foreign students enrolled at a U.S. institution are also eligible for support. Support for the experts-in-training, if considered employees by the submitting institution, can be requested under Personnel categories of the Proposal Budget (NSF Form 1030); otherwise, support should be requested under Participant Support Costs (category F, NSF Form 1030; note that indirect costs are not allowed on Participant Support). PEET awards would be eligible for supplementation through the REU (Research Experiences for Undergraduates, brochure NSF 93-112) and ROA (Research Opportunity Awards, brochure NSF 94-79: Research in Undergraduate Institutions) programs.

3. **Computer Infrastructure**. All PEET projects are expected to incorporate computerization of various taxonomic tasks; specimen databases, artificial intelligence systems, computer-aided image analysis, or interactive identification keys are examples. Specific activities or products will depend upon the state of the science for that particular taxonomic group; the suitability of proposed computerization activities will be evaluated through the merit review process. The UNESCO-supported Expertise Center for Taxonomic Identification and the Australian ERIN (Environmental Resources Inventory Network) provide models for computer-based activities. Investigators are expected to ensure community access through such systems as BIOTA (Biosystematic Information on Terrestrial Arthropods), the Biodiversity Information Network (BIN21), or other InterNet systems. Training in computer activities for Principal Investigators and students, through workshops or other means, would constitute an eligible expense under PEET awards.

Who May Submit

Proposals under the Partnerships for Enhancing Expertise in Taxonomy Special Competition will be accepted from U.S. institutions including botanical gardens, marine or freshwater institutes, and natural history museums that are eligible for awards from the National Science Foundation. Non-academic institutions with university-affiliated training programs are especially encouraged to apply. When appropriate, collaborating scientists at foreign institutions can be accommodated through consultant or subcontract mechanisms administered by the submitting U.S. institution.

Normally, NSF does not support research with disease-related goals, including work on the etiology, diagnosis, or treatment of physical or mental disease, abnormality, or malfunction in human beings or animals. Studies of animal models for such conditions, the design and testing of drugs or other procedures for their treatment are also not eligible for support. NSF does not normally support technical assistance, pilot plant efforts, research requiring security classification, the development of products for commercial marketing, or market research for a particular project or invention.

Scope and Duration of Projects

Projects designed for five years (60 months) of effort are encouraged, with yearly budgets not to exceed $150,000 (direct plus indirect costs), or $750,000 total. Projects may address large, natural genera or groups of phylogenetically related genera, and through collaboration with foreign colleagues, may involve field work in any part of the world as well as laboratory and museum study. Standard components of taxonomic monography—species description and diagnosis, geographic distribution, scientific nomenclature, identification keys, illustration—are expected in all projects; student training and computerization activities will complement these components. NSF anticipates making 10-20 awards as continuing grants in Fiscal Year 1997 in this second PEET Special Competition, contingent upon the availability of funds and the quality of proposals received. Special Competitions in future years are contingent upon the availability of funds. One-time renewals (submitted in the fourth or fifth year of the first PEET award, and for up to five additional years) may be considered but will compete with new proposals, and again are contingent upon availability of funds.

Projects under the PEET Special Competition are intended to augment revisionary and monographic projects currently supported by the Systematic Biology program at NSF. PEET proposals require training and computerization components beyond those representative of current awards in Systematic Biology. PEET proposals will be reviewed in response to the **March 1, 1997 deadline**; regular proposals in Systematic Biology compete following the **June 15 and December 15 target dates** for the Systematic and Population Biology Cluster in the Division of Environmental Biology.

The PEET Special Competition is designed to complement the Biotic Surveys and Inventories Program (brochure NSF 94-66) which focuses on the collection, description, and classification of broad taxonomic resources (for example, all vascular plants, all arthropods, all vertebrates) in a particular geographic area, with a commensurate reduction in detail accorded each species. **Duplicate proposals to the two programs are not allowed.** PEET, the Biotic Surveys and Inventories competition, and the regular programs in Systematic Biology and in Research Collections in Systematics and Ecology (brochure NSF 93-116) address in a coordinated manner the three major missions described in the "Systematics Agenda 2000" report cited above in order to discover, understand, and manage systematic knowledge of biological diversity around the globe.

Guidelines for Proposal Preparation and Reviewer Evaluation

Proposals should be prepared and submitted in accordance with the guidelines and forms in the "Grant Proposal Guide" (GPG, brochure NSF 95-27). Standard forms and an explanation of their preparation and purpose are contained in the GPG. Please note the 15-page limit on Project Description (to include the Prior Results section, if required, and all tables and figures) and restrictions on appended materials.

The proposal should address the following five issues in the Project Description (NSF Form 1360) or where otherwise indicated:

1. *Taxonomic Focus.* All groups of organisms whether aquatic or terrestrial are eligible for study, but preference will be given to those designated as understudied or critical. If the target group of organisms is delimited geographically and not taxonomically, the Principal Investigator should justify why the particular regional focus has been adopted; otherwise, faunistic or floristic projects should be directed to the Biotic Surveys and Inventories Program. The proposal must include a digest of currently recognized taxonomic entities, a summary of known museum specimens (number, quality, accessibility), and a review of pertinent literature. If the proposed research includes the collection of vertebrate animals, the Investigator must address the guidelines on page 12 of the Grant Proposal Guide (NSF 95-27).

2. *Methods of Study.* Practices will vary according to the organisms proposed for study, but attention should focus on collection and sampling strategies, specimen preparation with computerization of collection data, acquisition of character data in formats retrievable by computer, and explicit protocols for evaluating and synthesizing data. Field collecting may be necessary for some groups; others may be well represented in existing collections. The care of vouchers and other collections should be described; specimen cases and other curatorial supplies constitute eligible expenses. Where taxon ranges extend beyond the borders of the U.S.A., attention should be given to collaboration with foreign scientists and students. Prospective investigators who wish to establish working relationships with foreign scientists prior to submitting a proposal should refer to brochure NSF 96-14, "International Opportunities for Scientists and Engineers: Program Announcement" or its revisions, from the Division of International Programs at NSF.

3. *Training.* A minimum of two collaborating experts-in-training is required for each project, whether undergraduate, graduate, or postgraduate in status. As students graduate or otherwise complete their traineeship during the five-year project, new trainees should be recruited to maintain a minimum of two for each Principal Investigator. Trainees should be full partners in the research, conceptually and operationally. When known at time of application, a trainee's identity and qualifications should be described in a Biographical Sketch (NSF Form 1362), following GPG guidelines (page 6, GPG). The submitting institution's rules govern whether trainees can be designated as co-Principal Investigators on the Cover Sheet (NSF Form 1207).

4. *Conceptual Issues.* In the context of a highly competitive merit review, proposals must make a case for substantial impact on progress in taxonomy (NSF's general criterion No. 2: GPG, page 13). The proposal should discuss how improvement in the taxonomy of the targeted organisms relates to issues fundamental to systematics. Phylogeny, character evolution, biogeography, coevolution, or ecological interaction are examples of conceptual domains likely to prove relevant to taxonomic revisionary and monographic work (see the report "Systematics Agenda 2000: Charting the Biosphere" cited above and the 1991 report "The Sustainable Biosphere Initiative" from the Ecological Society of America).

5. *Dissemination of Result*s. Publication of results in peer-reviewed outlets is expected for all projects. In addition, enhanced or supplemented media such as computer databases accessible over InterNet, image-based identification aids, or GIS-compatible specimen records are expected.

Proposals will be evaluated in accordance with the four general NSF criteria described in the Grant Proposal Guide (page 13) and in accordance with the five requirements described above. In addition, cost sharing is required for all projects submitted in response to this announcement. The proposed cost sharing will be considered in evaluating proposals and will be a condition of any resulting awards. The amount of cost sharing must be shown in the proposal in enough detail to allow NSF to determine its impact on the proposed project. Documentation of availability of cost sharing must be included in the proposal (line M of the NSF Form 1030 and explained in the Budget Justification). Only items that would be allowable under the applicable cost principles, if charged to the project, may be included as the grantee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants and contracts. Contributions from non-Federal sources may be counted as cost sharing toward Federal projects only once.

Partnership Components

Institutional cost sharing in accordance with standard NSF rules is expected on all projects (NSF Grant Policy Manual, paragraph 643). Support beyond these minimum requirements will significantly strengthen the proposal as described above. Institutional commitment to the employment of taxonomists during and beyond the duration of PEET projects provides one clear example of partnership in answering the scientific and societal challenge of diminishing taxonomic expertise. Waiver of tuition, purchase of necessary equipment, and costs of illus-

tration, publication, or computerization are further examples of institutional commitment.

Application and Timetable

Proposals should be submitted for a **March 1, 1997 postmark deadline** to the address given in the "Grant Proposal Guide" (NSF 95-27, page 2):

NSF Program DEB-PEET (NSF 97-21)
National Science Foundation PPU
4201 Wilson Boulevard, room P60
Arlington, VA 22230

Review will be complete by late spring, with awards announced in the summer. The NSF publication "Grant Proposal Guide" provides relevant forms and rules for proposal preparation. On the Cover Sheet (NSF Form 1207) write "DEB-PEET (NSF 97-21)" in the upper left corner of page 1 to expedite processing.

Award Administration

Grants awarded as a result of this announcement will be administered in accordance with the terms and conditions of "Grant General Conditions" (NSF GC-1) or "Federal Demonstration Partnership General Terms and Conditions" (NSF FDP-III), depending on the grantee organization. Grantees are expected to submit an annual report on NSF Form 1328 (1/94) as shown on page 31 of GPG (NSF 95-27) to the cognizant Program Officer at the end of each award year. The report should include information on scientific progress, student recruitment, specimen acquisition, and databasing. Upon completion of the project, a Final Project Report (NSF Form 98A), including the Part IV Summary, will be required. NSF will send the form with Part I information preprinted to the Principal Investigator approximately one month prior to the grant's expiration date. Applicants should review the sample form in GPG (pages 37-39) prior to proposal submission so that appropriate tracking mechanisms are in place to ensure that complete information will be available at the conclusion of the project.

If the submitting institution has never received a NSF award, it is recommended that appropriate administrative officials become familiar with the policies and procedures in the NSF Grant Policy Manual (NSF 95-26, July 1995), for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, D.C. 20402. The telephone number at GPO is (202) 783-3288 for subscription information. If a proposal is recommended for an award, the NSF Division of Grants and Agreements will request certain organizational, management, and financial information. These requirements are described in Chapter III of the NSF Grant Policy Manual.

For Further Information

Questions concerning PEET proposals should be directed to:

Division of Environmental Biology (PEET)
National Science Foundation
4201 Wilson Boulevard, room 635
Arlington, VA 22230
703-306-1481
fax: 703-306-0367
e-mail: sysrev@nsf.gov

Other Programs

The NSF Guide to Programs, available from the NSF Forms and Publications Unit, contains brief descriptions of all Foundation research and education programs. Write to NSF, Attn: Forms and Publications, 4201 Wilson Boulevard, Arlington, VA 22230; 703-306-1130; fax 703-644-4278; e-mail pubs@nsf.gov.

Programs related to the PEET Special Competition in the Directorate for Biological Sciences (BIO) include:

- Division of Environmental Biology (DEB), 703-306-1480, in particular: Research Collections in Systematics and Ecology (brochure NSF 93-116) and Biotic Surveys and Inventories Program (brochure NSF 94-66);
- Division of Biological Infrastructure (DBI), 703-306-1470, in particular the programs in Database Activities and BIO Research Training Groups.

Programs related to PEET in the Directorate for Social, Behavioral, and Economic Sciences (SBE) include:

- Division of International Programs (INT), 703-306-1710, in particular the International Opportunities for Scientists and Engineers: Program Announcement (brochure NSF 96-14).

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research related programs described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Privacy Act and Public Burden. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate programs. See Systems of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995). Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Herman G. Fleming, Reports Clearance Officer, Contracts, Policy, and Oversight, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial (703) 306-0090; for FIRS, 1-800-877-8339.

The Special Competition described in this announcement is in category 47.074 in the Catalogue of Federal Domestic Assistance.

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